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United States Patent [19]

Jacobsen et al.

[11] **Patent Number:** **5,860,957**[45] **Date of Patent:** **Jan. 19, 1999**[54] **MULTIPATHWAY ELECTRONICALLY-CONTROLLED DRUG DELIVERY SYSTEM**[75] Inventors: **Stephen C. Jacobsen; Roland Wyatt; Stephen C. Peterson; Tomasz J. Petelenz**, all of Salt Lake City, Utah[73] Assignee: **Sarcos, Inc.**, Salt Lake County, Utah[21] Appl. No.: **797,295**[22] Filed: **Feb. 7, 1997**[51] **Int. Cl.⁶** **A61M 65/20**[52] **U.S. Cl.** **604/156; 604/30; 604/65; 604/140**[58] **Field of Search** 604/30, 31, 65-71, 604/118, 131, 140, 151, 153, 156, 246[56] **References Cited****U.S. PATENT DOCUMENTS**

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A low-profile multipathway automatic drug delivery system utilizing a battery powered control pad coupled to a disposable drug storage and delivery system and strapped to a patient's limb or torso. A preprogrammed or on-demand drug administration sequence is input to the control pad. When a drug is to be administered, the control pad ignites a high energy density propellant charge in the drug delivery system. Expanding propellant gas exerts pressure on a drug in a second chamber and forces it from the storage reservoir. Depending upon the type of drug delivery system required for the drug being administered, the propellant will either: (i) force a hypodermic needle into a patient's muscle tissue, propel the drug in the storage container into the needle embedded in the patient, and withdraw the needle; (ii) force the drug from the storage container through a jet nozzle where the drug is injected into subcutaneous tissue; (iii) force the drug from the storage container into a patch for passive transdermal delivery; (iv) force the drug into a patch for iontophoretic transdermal diffusion; or (v) force together two drugs stored separately that are unstable when mixed, and then administer them through one of the methods described in steps (i) to (iv).

42 Claims, 6 Drawing Sheets